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# Use of connections and architecture dynamics in enterprises employing disabled individuals

Shogo Kamei[a,]* Masakazu Ohashi[b]

[a]*Graduate School of Policy Studies, Chuo University, Tokyo, Japan*
[b]*Chuo University, 742-1 Higashinakano,Hachioji-shi,Tokyo,192-0393,Japan*

**Abstract**

This paper analyzes the process of the wine manufacturer that employs disabled individuals, from the production of wine as a welfare business to the wine which was used for the toast at the Summit leaders dinner, and to further use this information in making a process with regards to the dynamic change of connections in the new business creation process of companies. The method used herein is to identify the role that connections play in new businesses development. The second step of the process is to highlight the changes in the strength of connections by dynamically describing the system architecture described in the open and close as well as in the integral and modular. As a result, it was found that the strength and architecture of connections in that process remained in four main stages. Simultaneously, it was discovered that the larger the degree of change to the integral of the dynamic change of the process, the longer they would persist.


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* Corresponding author. Tel.: +0-000-000-0000; fax: +0-000-000-0000.
*E-mail address:* sk_uniteds@yahoo.co.jp, kamei@tama.ac.jp


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## 1. Problem Awareness

Using the "2011 edition White Paper on Small and Medium Enterprises" published by the Small and Medium Enterprise Agency, the survival rate after a certain period of companies registered in the Teikoku Databank, Ltd. as being in practice between 1980 and 2009 can be determined. The survival rate from start of business after ten years is70%, but drops to 50% after 20 years. Additionally, according to the "2012 Corporate Bankruptcy Investigation for Corporations with Over 30 Years in Business" by Tokyo Shoko Research, there were 3,320 well-established companies that had been in business for more than 30 years that went bankrupt in 2012, and despite the fact that this was a decrease of 84 from the 3,404 from the previous year, the ratio of the total number of bankruptcies was 31.2%. This figure increased for two consecutive years. The well-established companies that went bankrupt in 2012 based on capital, in the category with more than 50 million yen, but less than 100 million yen, the ratio was the highest with 51.6% (the previous year was 49.7%), followed by 45.7% in the category of individual companies; the category with more than 10 million yen, but less than 50 million yen accounted for 43.9 %. Additionally, the average lifespan of the companies that went bankrupt in 2012 was 23.5 years.

Enterprises also have a set lifespan, and even businesses that were once well-established can go bankrupt if they are unable to keep up in a constantly changing world. This tendency can be significant in small- and medium-sized enterprises with vulnerable infrastructures, and it is also prevalent in the rapidly changing manufacturing industry. On the other hand, one can find companies for which the foundation is thought to be weak, while seeming to be classified into a specific group in which small- and medium-sized enterprises must specialize to survive, that actively expand business in a sustainable manner by means of innovation. This paper elucidates the sustained growth mechanism for companies by examining one of these cases.

## 2. Hypothesis construction

### *2.1. Review of prior research*

In previous studies on the life span of enterprises, Geus [1] stated that enterprises have life spans, and McGrath [2] stated that it is difficult to build sustainable advantage in a world of increasing complexity and an intensely changing environment. Thus, it is vital for the cycle of temporary competitive advantage to turn quickly. Innovation focuses on size and can be classified into incremental innovation and radical innovation (Dewar & Dutton [3]). Also, according to Dyer, Gregersen, & Christensen [4] regarding radical technology, "the incorporation of completely new elements in new product architecture components will lead to new connections."

In discussing growth strategies of small- and medium-sized enterprises and inter-organizational relations, Yamakura [5] views the knowledge that is formed in process of interaction between the two organizations is relationship-specific and fixed in relation to inter-organizational cooperation. According to Badaracco [6], enterprises have to deal with environmental change by destroying the boundaries between internal and external, or making these boundaries vague.

Chesbrough [7] perceives networking outside the company as a way to create value through open innovation. From an architecture perspective, Kishi [8] proposed the architecture of a closed world in an open relationship to change the quality of innovation from incremental to radical.

For the formation of ties, Granovetter [9] suggests that weak connections perform a crosslinking function within a network that lead to the possibility of information with no redundancy; Hansen & Lovas [10] showed the superiority of weak connections in the transfer of knowledge. Watts [11, 12] and Watts & Strogatz [13] have advocated the superiority of information transmission in small-world networks.

Based on the aforementioned prior regarding inter-organizational cooperation in dealing with environmental changes, one can see the importance of various viewpoints and usages in context with the contrast of weak and strong connections in network utilization. In addition, new knowledge is presented in accordance with the context and shifting dynamics of architecture. However, regarding the relationship between two parties in inter-organizational cooperation, nothing can be found describing the dynamic process changes and synchronization of network and architecture.

### 2.2. Cycle synchronization of connections and architecture in radical innovation

Kamei&Ohashi [14] described a process by focusing on connections and architecture, and synchronizing these elements dynamically to elucidate the dynamic processes in the two-party collaboration between organizations.

In a highly uncertain environment, changes in connection strength may be described by dynamically describing the architecture system as “open” or “closed,” as well as “integral” and “modular,” in relation to the dynamic changes in connections within the vital new business creation process required by companies to achieve sustainable growth. Continual complexity and uncertainty is accompanied by resource limitations for small- and medium-sized companies. This paper validates the idea that small- and medium-sized companies that have a strong tendency to specialize, based on the research theme of how best to find and use external resources and create original processes, and through interviews of stakeholders in a medium-sized tent manufacturer, are changing dynamically in four stages in the new business creation process between two parties, based on the architecture and strength of connections.

In addition, the synchronization cycle of connections and architecture in the radical innovation implementation process is shown in Figure 1. Small circles represent the organizations that enclose the process, and the depth of the outlines shows the strength of modularization as a modular. In other words, thicker circle outlines indicate, stronger modularization. Arrows indicate the correspondence between the function and process, and represent correspondence between the newly added processes and functions amongst the two parties forming ties. In other words, the one-to-one relationship is modular, and a many-to-many relationship is shown as an integral. Additionally, the large round frame shows a closed reduction and the thicker circle outline indicates a stronger closed reduction; conversely, a thinner outline indicates a weakened closed reduction. In Figure1, the two parties initially in an open modular relationship with weak connections gradually shift to one with strong-ties and a closed integral to make innovation feasible. After innovation is complete, the relationship returns to one with an open modular again. For the medium-sized tent manufacture previously used as a case study, this entire process took approximately one year.

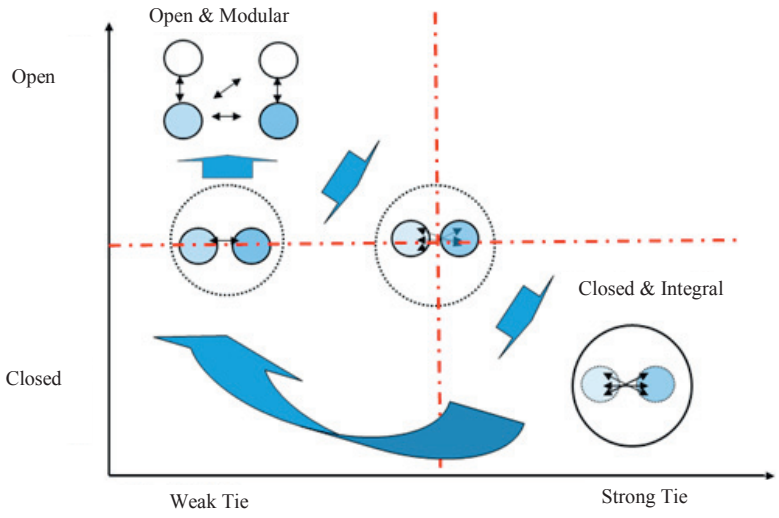


Figure 1: The Synchronization cycle of connections and architecture in the Radical Innovation Process. Source: Kamei & Ohashi [14]

*2-3. Hypothesis construction*

This paper analyzes the case of a small business that hired disabled individuals and created a new business with limited resources, despite the perception of being difficult, and to use this information to make a more robust process regarding the dynamic change of connections in the new business creation process of companies, as has been identified by Kamei&Ohashi [14].

The method, using the same first step as Kamei&Ohashi [14], is to clarify the role that connections play in new businesses development. The second step of the process is to highlight the changes in the strength of connections by dynamically describing the system architecture described in the open and close, as well as the integral and modular. As a hypothesis, paying attention the length of the process time in the four-stage process for creating new events based on Kamei&Ohashi [14] and the recent differences, the integral of the process architecture which changes that length adds a new hypothesis depending on the degree of the change.

[Hypothesis 1]

For a new business creation process between two parties, the strength of connections and architecture is verified in the following four steps.

First Stage: Weak connections are formed initially, and it is an open modular relationship.

Second Stage: Connections gradually become stronger, and it gradually becomes a closed integral.

Third Stage: Strong connections are formed, as is a closed integral.

Fourth Stage: Connections gradually weaken, and an open modular relationship is gradually formed.

[Hypothesis 2]

As for the difference in timing of the four stages of the circulation process, the change between the second and third stages is dependent on the degree of change to the integral of the process architecture.

## 3. Theme and method

The theme of the present study is to identify a new business creation process that utilizes external resources. This process is essential to the survival of small- and medium-sized enterprises having limited resources, and can be analyzed by examining the process of Coco Farm & Winery, a manufacturer that employs disabled individuals. While synchronizing the changes in the strength of connections and process architecture focusing on the correspondence between functions and processes, the dynamic process of the search for parties to serve as external resources is described, from first encounter to business construction, and then to changes within a new environment.

As the method of analysis, this paper describes the successful new business production process of the winery, and its shift from the production of wine as a welfare business to the production of the NOVO wine, which was used for the toast at the Kyushu-Okinawa Summit leaders' dinner. The changes in the strength of connections with external entities regarding this process and the design in the architectural concept of the process change are highlighted in the analysis. The analysis used business site visits and interview of party responsible for external resource and the start-up process of the company, which were obtained from literature, while focusing on dynamic changes.

## 4. Research and analysis

Using the prior study of an actual small manufacturing business, Coco Farm & Winery, and its move from the production and sale of wine to the new business of champagne, this paper describes the dynamic process involved in connections and architecture as a means to test the hypotheses. As a reasearch analytical procedure, the paper first provides an overview of the new business and company, as taken from literature, and then describes the process beginning with interviews of the stakeholder. It then describes the details of the process change. It should be noted that, led by Tama University's Professor Mochizuki Teruhiko, about 20 individuals in total volunteered from the Tama Graduate school Mochizuki seminar and the Hosei University Graduate School of Policy Creation for a tour of the winery that was conducted on May 20, 2011 from 10:00 A.M. to 2:00 P.M., and in which the first author also participated.

### *4.1. Coco farm & winery co., ltd.*

The following is from the homepage web site of Coco Farm & Winery. During the 1950s, junior high school students with intellectual disabilities from special classes in Ashikaga, Tochigi Prefecture, and their classroom teacher Kawada Noboru, cultivated vineyards on the steep slope of a mountain. Designated support facilities were built at the foot of the vineyard in 1969 marking the beginning of Coco Romi Campus. With parents agreeing to the idea of wine production, school director Kawada Noboru established Kabasaki industry, Co. in 1980 (later changing the name to Coco Farm & Winery) and obtained a liquor manufacturing license in 1984. Since then, about 90 individuals with intellectual disabilities joined together at the school to produce wine. As of 2013, the business has a capitalization of 40 million yen, and it is located in Ashikaga, Tochigi Prefecture, Tajima-cho 611. Hasegawa Tsubasa has been appointed as the Representative Director, Chieko Ikegami as the Senior Managing Director, and Bruce Gutlove, Iwao Furusawa, and Ochi Machiko as Directors.

The enterprise became famous in July 2000, with an opportunity to serve NOVO champagne wine at the summit dinner in Okinawa's Shuri Castle on the occasion of the Kyushu-Okinawa G7 summit. At the summit, the wine was served to world leaders at a toast. The business had made the transition to producing wine as a welfare concern to the production of a world-renowned sparkling wine.

### *4.2. Journey from welfare business to champage production and summit toast*

The following is based on a statement by Kawamoto [15]. To outline the advance of the company into the champagne-making field, we must go back to 1988. The company was hit by bad weather in its fifth year as a winery, and it received a supply of grapes from the Cline Family Farm near Sacramento, U.S.A. This connection led to Fred Cline's younger brother, Matt Cline, who was also the person responsible for winemaking. Arrangements were made for Matt to visit Japan. At the time, Mr. Kawada had the impression that "the quality of the wine is such that people buy it out of compassion, so we must make it better." He thus asked Cline to introduce brewing engineers from California to make sufficiently good wine that people would buy it for its quality. Matt mentioned Bruce Gutlove, a friend from his university days, as a top candidate. Gutlove was born in New York in 1961, and is a third generation Italian. He entered the University of California Davis in 1985, majoring in Food Science. After obtaining his Master's degree, he began working as a winemaker consultant. Coco Farms invited Gutlove in 1989, where he reviewed the entire operation, from grape cultivation to harvesting, up to the production of wine. Gutlove made continual improvements without compromise.

Throughout 1992, a party of six, including Mr. Kawada and Gutlove, visited several champagne makers in the Champagne region of France, where a friend of Gutlove's from his university days was in charge. While there, the party observed the tanks, fermentation and ageing barrels, and cellars. Kawada felt that the sparkling wine manufacturing process of Methode Champenoise would fit well with the manual labor of disabled individuals, and he resolved to produce sparkling wine at Coco Farm. He named this sparkling wine "NOVO." The steep cliff at the farm was drilled even further to make a cellar, and the first phase of NOVO was completed in 1995. The prominent sommelier Shinya Tasaki, who visited the winery in 1999, was entrusted with the selection of all drinks for the Kyushu-Okinawa G7 Summit leader's dinner to be held in July 2000, and he selected NOVO as the wine for the toast, leading to it being used for the toast in Shuri Castle.

### *4.3. Content of interview with director Bruce Gutlove of Coco Farm & Winery ,Ltd.*

The following is from an interview with Coco Farm & Winery Director Bruce Gutlove by the first author. The interview was conducted on February 10, 2014, from 10:00 A.M. to 12:00 P.M. in the conference room of 10R Winery, where Mr. Gutlove is involved as a winemaker, located in Hokkaido Iwamizawa Kurisawa town, Kamihoro 1123-10. It was a face-to-face interview.

Question 1: What was the situation when you were first invited to Japan, and what did you think of it?

When I received a call from an official at Coco Farm asking me to come to Japan, I thought it was a joke. I had no idea that they were even producing wine in Japan.

Question 2: Why did you decide to take the position?

The official from Coco Farm came to visit me in San Francisco. We had a discussion while eating a meal, and I was moved when I heard the story of people with intellectual disabilities helping each other and making wine. As a Christian, I felt as though I would like to help the school with the production of wine. I asked for six months off from my place of work in Napa, and I came to Japan in October of 1989. I promised to watch the process for six months, from fermentation to bottling.

Question 3: What was your first impression?

I was surprised at the steep slopes of the vineyard. I was also surprised by the vineyard trellising and training, a system unique to Japan. In Europe and the United States, espalier training is common. It was also my first experience interacting with people with intellectual disabilities. The climatic conditions such as temperature and precipitation were also different, but I felt that the awareness of wine and cultural values were quite different.

Question 4: How was it after you got used to it a bit?

I tasted dozens of wines from COCO FARM, but in a word, they were all sweet. This was following Japan's tradition where wine should be sweet. There were also several places making wine in Japan that were using table grapes for winemaking. I thought that this was quite different with the cultural values I had regarding wine, so I believed things would take a long time. On the other hand, none of the students at the school treated me as a foreigner, in other words an outsider, and they interacted with me as though I was just a normal colleague.

Question 5: What was the first thing you changed?

In the beginning, I did not say anything about the vineyards. I ensured that the winemaking facility was properly cleaned and organized. Bacterial contamination degrades the wine. Next, preparation and fermentation was conducted using the Japanese traditional Koshu species, and I was able to show everyone that we were able to create a more fragrant and balanced wine than had been done so far.

Question 6：Why did you decide to stay involved after the promised six months had passed?

Although I discussed what to do with the staff of the winery, I felt as though they did not understand most of it. Nothing had changed since when I first came, so my pride as a consultant would not allow me to leave. Also, while facing a handicap, from the appearance of the students greeting me each morning with a smile and diligently working in silence to produce wine, I felt some shared values. I began to believe that there was an important meaning to growing the wine grapes together with the students, and I was also affected by Mr. Kawada who created the winery.

Question 7: What are some things you have done after deciding to stay long-term?

To improve the taste of Japanese wine, I thought it was important to improve on the quality of the grapes. I began to focus on the cultivation of the native Muscat Bailey A and the Koshu species since they were adapted to the climate of Japan. I invited a grape consultant from Australia through an acquaintance and we began to review and reform vineyard practices, especially trellising; we took the old "shelf"-styled trellis system and turned it upside down and changed it to a "Geneva Double Curtain." Regarding the white paper bag used as an insect repellant when summer is approaching, it shielded the sunlight necessary to increase the sugar content of the grapes, so we changed it to a transparent cap. If the grapes do not ripen, increasing the sugar content, then it will not become a fine wine. While it was also typical to harvest early due if faced with an approaching typhoon, we waited until the last possible moment, constantly checking the weather forecast. Therefore, harvesting became a very busy, rushed task, and the selection process was difficult, but the students removed every single berry from the damaged grape clusters. When interacting with the students in a business sense, I was strict and gave precedence to the grapes and wine. In the production line, we worked together as professionals with quality being the only measure.

Question 8: What is the sparkling wine production history using the Champagne Method?

It begun from a discussion with Mr. Kawada around 1991 when it was mentioned that the grapes that were native to Japan may be suitable for vinifying in a traditional Champagne Method. The sugar content is low in the Koshu

species and the grapes have sugar percentage of 18% even if they are harvested late, but to produce a wine with a solid taste, a sugar content of 21–23% is necessary. The Champagne Method causes fermentation twice; once in a tank or barrel and once inside the bottle. Since the yeast will die if the original alcohol content is too high, grapes with low sugar content are used in the first fermentation. The second fermentation is then conducted in the bottle by putting in sugar and yeast at the same time. In other words, it was thought that the Riesling Lyon species or Koshu species that have low sugar content would adapt well with the secondary fermentation method. In addition, this requires storage for at least a year and a half at a constant temperature, and after a certain period the bottles are rotated in one-eight increments every day for six weeks to collect the sediments little by little by a process called remuage. I was reassured because the students were there to help with work that requires both time and effort.

Question 9: What is the sparkling wine process of the Champagne method?

For the initial preparation, I tried a wide variety of blends in the seven years between 1992 and 1998. I also gradually changed the grapes from the Koshu to the Riesling Lion species. Also, I used reserve wine in the 1993–1996 blend, but I switched to using wine from the same year in 1997. Therefore, the process was completed after 1999. Considering the establishment of the cultivation of the vineyards, it may have been after 2000. NOVO was then chosen to be used as the wine for the toast at the July 2000 Kyushu-Okinawa G7 Summit leader's banquet.

Question 10: What are you currently doing at Coco Farm & Winery and 10R Winery?

Although I am currently responsible for management as a director, the younger people have developed quite well, and the winery process has reached a level to where it can be left in their hands. The level of the questions they ask about winemaking has also become quite high, and the younger individuals realize the importance of thinking about the process and coming up with new ideas. The making and values of wine have dramatically changed over the last two decades. The interest of wine lovers in Japan will undoubtedly shift toward the origin of the raw material of wine which is the grapes. I am currently involved in viticulture and brewing development that can stand up to world class evaluation in Hokkaido, one of the primary grape producing areas of Japan.

### *4.4. Response to process changes*

#### *4.4.1. Responding to cultivation process changes*

There are four main points in the transformation of the cultivation process. The first is the shift of the cultivation method to a Geneva Double curtain system from the old shelf styled trellis system. The second is changing the white paper bags being used as insect repellants in the summer to transparent caps. The third is the shift to the late harvest method and waiting until the last possible minute when the typhoons come. The fourth is the transition to rigorous selection process with the goal of 100% quality.

#### *4.4.2. Champagne method used for the NOVO sparkling wine*

The following is from the homepage web site of Coco Farm & Winery. The NOVO aging reservoir is a simple cellar made by digging a tunnel in the mountain behind the brewery, using iron plates as the walls and ceiling, and nailing the stem of grapes to the front door as a knob. A temperature of 13–15 °C is maintained year-round. Also, in the room used for the remuage to dosage process, the sediments are frozen to −30 °C, so it is made into a room capable of creating a space with a temperature of 0 °C to remove the sediments at a low temperature. Primary fermentation is done using the same type of barrel used in typical wines. The following five specific steps are followed for the champagne method sparkling wine.

(1)Secondary fermentation in the bottle (Deuxieme fermentation process).

(2)Daily rotating the bottles 45° to gather the sediments near the cork (Remuage process).

(3)Freezing and then removing the sediments (Degorgement process).



(4)Adding the “liqueur of departure” after removing the sediments (Dosage process).

(5)Inserting the cork and placing the wire (le Bouchage process).

Figure2 The Champagne method used specifically for sparkling wine. Photo Source: homepage web site of Coco Farm & Winery

## 5. Considerations

Below, the relationship changes with regards to the sparkling wine production project from the perspective of connections and processes, focusing on Coco Farm & Winery and its initial external resource, Mr. Bruce Gutlove, will be dynamically considered.

As the first stage, the winery had approximately five years of experience as a wine producer before meeting Gutlove, and had a modular process that had previously been modularized by doing work such as using the old shelf styled trellis system for the cultivation of grapes and using white paper bags in the summer to protect the grapes from pests. However, since the founder, Mr. Kawada, was not content with merely selling wine because it was made by disabled individuals, he invited Gutlove from an open environment with weak ties to create authentic wine. As the second stage, Bruce came to Japan with a promise to stay for six months, and realized that wine making at Coco Farm faced a problem that extended to Coco Farm values. However, he cleaned the winemaking facility and

organized it, and began to produce wine fermented with Koshu species grapes. While doing so, he began to gradually interact with the disabled individuals that were to become his co-workers. These individuals developed a closer relationship, and ties became stronger. At the third stage, Gutlove decided to stay long-term, and reinvigorate the process, beginning with grape cultivation. He utilized a grape consultant, shifted to Geneva Double curtain shelf system from the old shelf styled trellis system, began the late harvesting of grapes, and implemented a thorough sorting method. His relationship with the disabled individuals became professional and uncompromising, and they in turn accepted this. For winemaking as well, he went with Mr. Kawada and others to the Champagne region of France to observe sparkling wine fermentation and ageing, and after the construction of cellars, he began earnestly trying to produce sparkling wine through the trial and error of different blends. The relationship at that point became a closed one, and the only intersection in the wine process was the primary fermenting in a barrel; a secondary fermentation process was added later. For the cultivation process as well, the shift to the use of Geneva Double curtain shelf system was also made. In other words, the process became integral and the ties became firm. Now at the fourth stage, time has passed since the completion of the process, modularization is progressing, and Gutlove's successors are responsible. Gutlove has also begun looking at new projects, such as the development of wineries in Hokkaido. Although social links remain strong, these ties will gradually weaken.

Through stages like these, the winery was able to produce a sparkling wine recognized worldwide. When observing the innovation that occurred here in a static manner it may appear to have been an incremental process. When viewed dynamically, however, the temporary destruction of the existing modular process and shift to an integral process, as well as the difficulties discussed in the interviews of Gutlove, suggest that there was radical innovation. In this case as well, the synchronization cycle of connections and architecture in the radical innovation implementation process shown in Figure 1 holds true.

It should be noted that when compared with the cyclical process of tent manufacturers discussed by Kamei&Ohashi [14], the entire process of the tent maker took only one year, and the process described in this paper took over ten. This is because the tent maker affected the radical innovation of shifting from industrial to commercial tents, and many parts of the basic process were common. The objective in the case examined in this paper was the shift from that of a welfare business to a world-renowned wine maker; a secondary process began with a fundamental shift in the cultivation method and creation of cellars. This was done with a complete lack of prior experience, and individuals involved implemented the Champagne method for creating. Because of this, the integral for the shift between the second and third stages was extremely high. In other words, it was found that the period of the cyclic process was reliant on the integral degree of conversion in the process architecture associated with radical innovation. The higher the integral degree of conversion in the process architecture, the longer the cycle tends to become.

## 6. Conclusion

Two hypotheses were validated from the aforementioned discussion. The first hypothesis states that for any new business creation process between two parties, the strength of ties and architecture transitions dynamically in four stages. This hypothesis was supported by our findings. The second hypothesis states that the time difference of the four stage cyclical process relies on the integral of the process architecture, which changes between the second and third stages. This hypothesis was also supported by our findings. From this research, the hypotheses of Kamei&Ohashi [14] that dynamically revealed the types of connections that are the seeds of radical innovation leading to sustainable growth are born from, and in what way those ties change together with the process architecture was made more robust, and the cycle period was able to detect differences by the integral degree of conversion in the process architecture.

Accordingly, the two concepts of the effect of the strength of connections and whether this effect is open module or integral make dualistic and confrontational discussions difficult, and these concepts appeared to be in continuous change when observed dynamically. Based on these dynamics, one can see the implication of generalizing this idea as one measure of sustainable growth for enterprises.

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